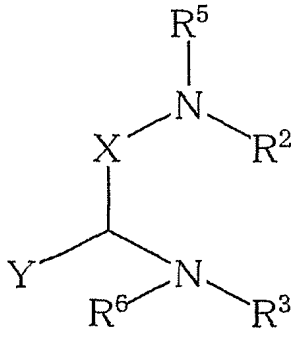
C L A I M S

1. A compound of the formula (I):



(I)

wherein

X is -CO- or $-(CH_2)_k-$ (wherein k is 1, 2 or 3);

Y is

(1) lower alkyl, or

(2) $Z-(CH_2)_n-$,

{wherein

Z is

(1) aryl, or

(2) $R^1-CO-NR^4-$

(wherein

R^1 is (1) aryl, heterocyclyl,
aryl-(lower alkyl),
aryl-(lower alkoxy), or
heterocyclyl-(lower alkoxy),
each of which may be substituted
with one or more substituent(s)
selected from the group
consisting of

(a) lower alkyl,

(b) halogen and

(c) hydroxy; or

(2) lower alkoxy; and

R^4 is hydrogen, or lower alkyl); and

n is 1, 2, 3, 4, 5 or 6};

R^2 is (1) lower alkyl, aryl-(lower alkyl) or (lower alkyl)thio-(lower alkyl), each of which may be substituted with one or more substituent(s) selected from the group consisting of

(a) heterocyclyl,

(b) carboxy,

(c) carboxy-(lower alkyl),

(d) amidated carboxy,

(e) (lower alkoxy)carbonyl which may be substituted with cycloalkyl, heterocyclyl or (lower alkanoyl)oxy; and

(f) cyano; or

(2) aryl which may be substituted with lower alkyl, lower alkenyl, aryl, lower alkoxy, (lower alkyl)amino, (lower alkyl)thio, carboxy, (lower alkoxy)carbonyl, (lower alkoxy)-(lower alkyl), (lower alkyl)amino-(lower alkyl), or (lower alkyl)thio-(lower alkyl), each of which may be further substituted with one or more substituent(s) selected from the group consisting of

(a) heterocyclyl,

(b) (lower alkoxy)carbonyl,

(c) carboxy and

(d) amidated carboxy;

R^3 is (1) $-Q-R^7$,

[wherein
Q is -CO- or -SO_2-,
R^7 is (a) lower alkyl which may be substituted with one or more substituent(s) selected from the group consisting of
cycloalkyl,
aryl which may be further substituted with aryl(s), and
heterocyclyl,
(b) lower alkenyl which may be substituted with one or more substituent(s) selected from the group consisting of aryl and heterocyclyl,
(c) cycloalkyl,
(d) aryl which may be substituted with one or more substituent(s) selected from the group consisting of
lower alkyl,
aryl which may be further substituted with hydroxy(s),
lower alkoxy,
aryloxy,
hydroxy, and
halogen,
(e) heterocyclyl which may be substituted with one or more substituent(s) selected from the group consisting of
lower alkyl,
aryl which may be further substituted with halogen(s), and
halogen,
(f) aryloxy, or
(g) amino which may be substituted with aryl(s) which may be further substituted with one or more substituent(s) selected from the

group consisting of aryl and heterocyclyl];
or

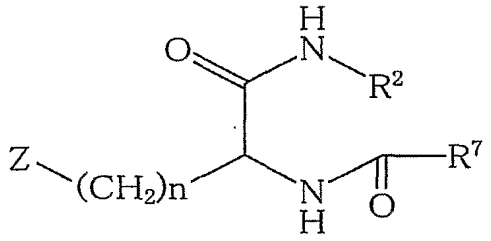
(2) lower alkyl which may be substituted with aryl(s) or heterocyclyl(s), each of which may be further substituted with aryl(s); and

R^5 and R^6 are independently hydrogen or lower alkyl; or

R^6 and Y may be linked together to form $-(CH_2)_m-$ (wherein m is 2, 3, 4 or 5);

or a pharmaceutically acceptable salt thereof.

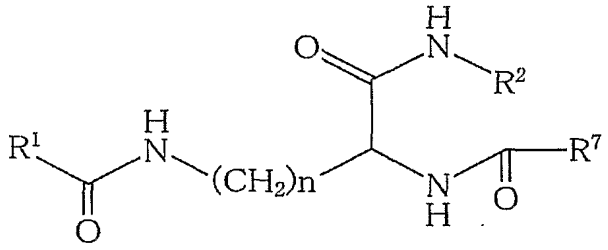
2. A compound of claim 1 having the formula (Ia):



(Ia)

wherein Z, R^2, R^7 and n are as defined above.

3. A compound of claim 1 having the formula (Ib):



(Ib)

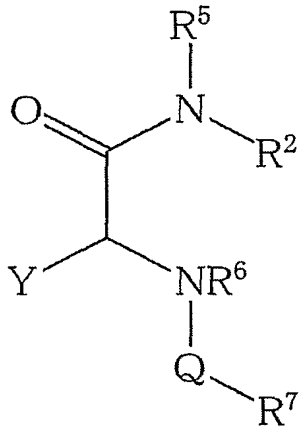
wherein R^1, R^2, R^7 and n are as defined above.

4. A compound of claim 3,
wherein
R^1 is aryl-(lower alkoxy);
R^2 is lower alky, or
aryl which may be substituted with carboxy-(lower alkyl);
R^7 is heterocyclyl which may be substituted with substituted with lower alkyl; and
n is 1, 2, 3, 4 or 5.

5. A compound selected from:
sodium 6-{(2S)-2-[(1-benzofuran-2-yl-carbonyl)amino]-5-[benzyloxycarbonylamino]pentanoylamino}-hexanoate,
(2E)-3-{2-[(2S)-2-[(1H-indol-2-ylcarbonyl)amino]-5-[benzyloxycarbonylamino]pentanoylamino]phenyl}-acrylic acid,
(2E)-3-{2-[(2S)-2-[(1-methyl-1H-indol-2-yl-carbonyl)amino]-5-[benzyloxycarbonylamino]-pentanoylamino]phenyl}acrylic acid,
3-{2-[(2S)-2-[(1-methyl-1H-indol-2-ylcarbonyl)-amino]-5-[benzyloxycarbonylamino]pentanoylamino]-phenyl}propanoic acid,
sodium 3-{2-[(2S)-2-[(2-quinolinylcarbonyl)amino]-5-[benzyloxycarbonylamino]pentanoylamino]phenyl}-propanoate,
6-[((2S)-2-[(1-benzofuran-2-ylcarbonyl)amino]-5-{[(benzyloxy)carbonyl]amino}pentanoyl)amino]-2-naphthoic acid,
3-{2-[((2S)-5-{[(benzyloxy)carbonyl]amino}-2-{[(8-methylimidazo[1,2-a]pyridin-2-yl)carbonyl]amino}-pentanoyl)amino]phenyl}propanoic acid,
3-[2-({(2S)-5-{[(benzyloxy)carbonyl]amino}-2-[(2-quinolinylmethyl)amino]pentanoyl}amino)-phenyl]propanoic acid, and

3-[2-({(2S)-5-{[(benzyloxy)carbonyl]amino}-2-[(1H-indol-2-ylcarbonyl)amino]pentanoyl}amino)phenyl]-propanoic acid.

6. A process for preparing the compound of the formula (Ia-1):



(Ia-1)

wherein

Y is

(1) lower alkyl, or

(2) $Z-(CH_2)_n-$,

{wherein

Z is

(1) aryl, or

(2) $R^1-CO-NR^4-$

(wherein

R^1 is (1) aryl, heterocyclyl,
aryl-(lower alkyl),
aryl-(lower alkoxy), or
heterocyclyl-(lower alkoxy),
each of which may be substituted with one or more substituent(s) selected from the group consisting of

(a) lower alkyl,
(b) halogen and
(c) hydroxy; or
(2) lower alkoxy; and
R^4 is hydrogen, or lower alkyl); and
n is 1, 2, 3, 4, 5 or 6};

Q is -CO- or $-SO_2-$;

R^2 is (1) lower alkyl, aryl-(lower alkyl) or (lower alkyl)thio-(lower alkyl), each of which may be substituted with one or more substituent(s) selected from the group consisting of
(a) heterocyclyl,
(b) carboxy,
(c) carboxy-(lower alkyl),
(d) amidated carboxy,
(e) (lower alkoxy)carbonyl which may be substituted with cycloalkyl, heterocyclyl or (lower alkanoyl)oxy; and
(f) cyano; or
(2) aryl which may be substituted with lower alkyl, lower alkenyl, aryl, lower alkoxy, (lower alkyl)amino, (lower alkyl)thio, carboxy, (lower alkoxy)carbonyl, (lower alkoxy)-(lower alkyl), (lower alkyl)amino-(lower alkyl), or (lower alkyl)thio-(lower alkyl), each of which may be further substituted with one or more substituent(s) selected from the group consisting of
(a) heterocyclyl,

(b) (lower alkoxy)carbonyl,
(c) carboxy and
(d) amidated carboxy;

R^5 and R^6 are independently hydrogen or lower alkyl; or

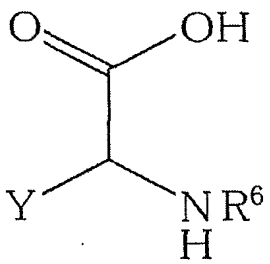
R^6 and Y may be linked together to form $-(CH_2)_m-$ (wherein m is 2, 3, 4 or 5); and

R^7 is (a) lower alkyl which may be substituted with one or more substituent(s) selected from the group consisting of
cycloalkyl,
aryl which may be further substituted with aryl(s), and
heterocyclyl,
(b) lower alkenyl which may be substituted with one or more substituent(s) selected from the group consisting of aryl and heterocyclyl,
(c) cycloalkyl,
(d) aryl which may be substituted with one or more substituent(s) selected from the group consisting of
lower alkyl,
aryl which may be further substituted with hydroxy(s),
lower alkoxy,
aryloxy,
hydroxy, and
halogen,
(e) heterocyclyl which may be substituted with one or more substituent(s) selected from the group consisting of
lower alkyl,

aryl which may be further substituted with halogen(s), and
halogen,
(f) aryloxy, or
(g) amino which may be substituted with aryl(s) which may be substituted with one or more substituent(s) selected from the group consisting of aryl and heterocyclyl];

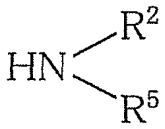
or a pharmaceutically acceptable salt thereof,

comprising, reacting a compound (IIa):



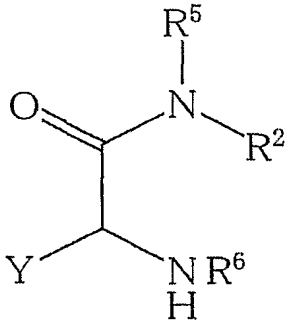
(IIa)

(wherein Y and R^6 are each as defined above), or its reactive derivative at the carboxy group or the salt thereof, with a compound (IIIa):



(IIIa)

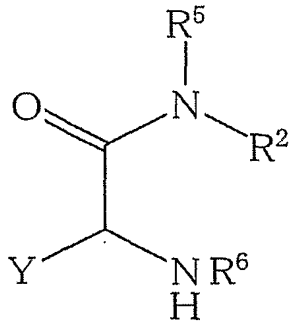
(wherein R^2 and R^5 are each as defined above), or its reactive derivative at the amino group or the salt thereof to give a compound (IVa):



(IVa)

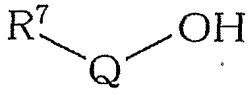
(wherein Y, R^2, R^5 and R^6 are each as defined above), or its salt; and

reacting the compound (IVa):



(IVa)

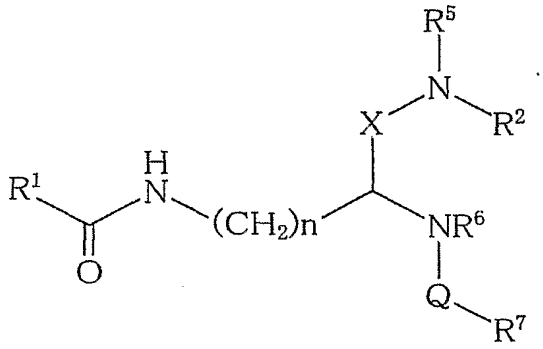
(wherein Y, R^2, R^5 and R^6 are each as defined above), or its salt, with a compound (V):



(V)

(wherein Q and R^7 are each as defined above), or its reactive derivative at the carboxy group (in case of Q is -CO-)/the sulfo group (in case of Q is $-SO_2-$), or the salt thereof.

7. A process for preparing the compound of the formula (Ib-1):



(I b-1)

wherein
X is -CO-, or $-(CH_2)_k-$ (wherein k is 1, 2 or 3);

Q is -CO- or $-SO_2-$;

R^1 is (1) aryl, heterocyclyl, aryl-(lower alkyl), aryl-(lower alkoxy), or heterocyclyl-(lower alkoxy), each of which may be substituted with one or more substituent(s) selected from the group consisting of
(a) lower alkyl,
(b) halogen and
(c) hydroxy; or
(2) lower alkoxy; and

R^2 is (1) lower alkyl, aryl-(lower alkyl) or (lower alkyl)thio-(lower alkyl), each of which may be substituted with one or more substituent(s) selected from the group consisting of
(a) heterocyclyl,
(b) carboxy,
(c) carboxy-(lower alkyl),
(d) amidated carboxy,

(e) (lower alkoxy)carbonyl which may be substituted with cycloalkyl, heterocyclyl or (lower alkanoyl)oxy; and

(f) cyano; or

(2) aryl which may be substituted with lower alkyl, lower alkenyl, aryl, lower alkoxy, (lower alkyl)amino, (lower alkyl)thio, carboxy, (lower alkoxy)carbonyl, (lower alkoxy)-(lower alkyl), (lower alkyl)amino-(lower alkyl), or (lower alkyl)thio-(lower alkyl), each of which may be further substituted with one or more substituent(s) selected from the group consisting of

(a) heterocyclyl,

(b) (lower alkoxy)carbonyl,

(c) carboxy and

(d) amidated carboxy;

R^5 and R^6 are independently hydrogen or lower alkyl; or

R^6 and Y may be linked together to form $-(CH_2)_m-$ (wherein m is 2, 3, 4 or 5);

R^7 is (a) lower alkyl which may be substituted with one or more substituent(s) selected from the group consisting of

cycloalkyl,

aryl which may be further substituted with aryl(s), and

heterocyclyl,

(b) lower alkenyl which may be substituted with

one or more substituent(s) selected from the group consisting of aryl and heterocyclyl,

(c) cycloalkyl,

(d) aryl which may be substituted with one or more substituent(s) selected from the group consisting of

lower alkyl,

aryl which may be further substituted with hydroxy(s),

lower alkoxy,

aryloxy,

hydroxy, and

halogen,

(e) heterocyclyl which may be substituted with one or more substituent(s) selected from the group consisting of

lower alkyl,

aryl which may be further substituted with halogen(s), and

halogen,

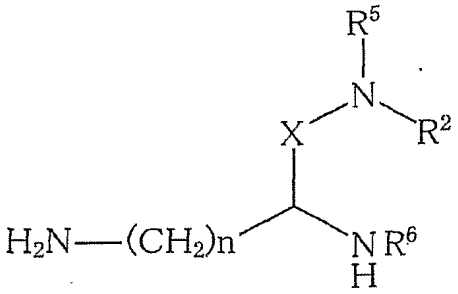
(f) aryloxy, or

(g) amino which may be substituted with aryl(s) which may be substituted with one or more substituent(s) selected from the group consisting of aryl and heterocyclyl]; and

n is 1, 2, 3, 4, 5 or 6;

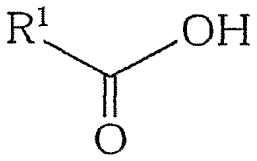
or a pharmaceutically acceptable salt thereof,

comprising, reacting a compound (IIb):



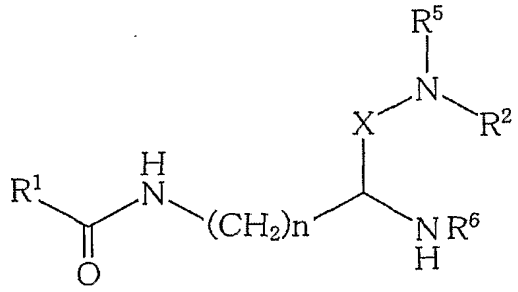
(IIb)

(wherein X, R^2, R^5, R^6 and n are each as defined above), or its reactive derivative at the amino group or the salt thereof, with a compound (IIIb):



(IIIb)

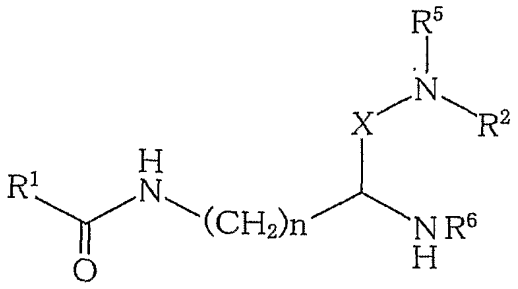
(wherein R^1 is as defined above), or its reactive derivative at the carboxy group or the salt thereof to give a compound (IVb):



(IVb)

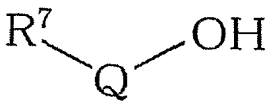
(wherein X, R^1, R^2, R^5, R^6, n and are as defined above), or its salt; and

reacting the compound (IVb):



(IVb)

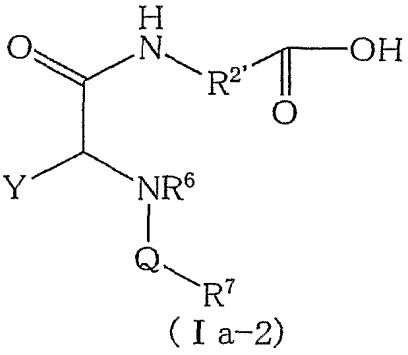
(wherein X, R^1, R^2, R^5, R^6 and n are as defined above), or its salt, with a compound (V):



(V)

(wherein Q and R^7 are as defined above), or its reactive derivative at the carboxy group (in case of Q is -CO-)/the sulfo group (in case of Q is $-SO_2-$),or the salt thereof.

8. A process for preparing the compound of the formula (Ia-2):



(Ia-2)

wherein

Y is

(1) lower alkyl, or
(2) Z-$(CH_2)_n$-,
{wherein
Z is
(1) aryl, or
(2) R^1-CO-NR^4-
(wherein
R^1 is (1) aryl, heterocyclyl,
aryl-(lower alkyl),
aryl-(lower alkoxy), or
heterocyclyl-(lower alkoxy),
each of which may be substituted
with one or more substituent(s)
selected from the group
consisting of
(a) lower alkyl,
(b) halogen and
(c) hydroxy; or
(2) lower alkoxy; and
R^4 is hydrogen, or lower alkyl); and
n is 1, 2, 3, 4, 5 or 6};

Q is -CO- or -SO_2-;

$R^{2'}$ is (1) lower alkyl, (lower alkyl)thio-(lower alkyl)
or aryl-(lower alkyl); or
(2) aryl which may be substituted with
lower alkyl, lower alkenyl, aryl,
lower alkoxy, (lower alkyl)amino,
(lower alkyl)thio,
(lower alkoxy)-(lower alkyl),
(lower alkyl)amino-(lower alkyl), or
[(lower alkyl)thio]-(lower alkyl);

R^6 is hydrogen or lower alkyl; or

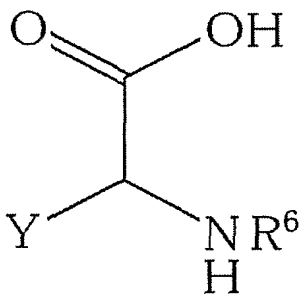
R^6 and Y may be linked together to form $-(CH_2)_m-$ (m is 2, 3, 4 or 5);

R^7 is (a) lower alkyl which may be substituted with one or more substituent(s) selected from the group consisting of
cycloalkyl,
aryl which may be further substituted with aryl(s), and
heterocyclyl,
(b) lower alkenyl which may be substituted with one or more substituent(s) selected from the group consisting of aryl and heterocyclyl,
(c) cycloalkyl,
(d) aryl which may be substituted with one or more substituent(s) selected from the group consisting of
lower alkyl,
aryl which may be further substituted with hydroxy(s),
lower alkoxy,
aryloxy,
hydroxy, and
halogen,
(e) heterocyclyl which may be substituted with one or more substituent(s) selected from the group consisting of
lower alkyl,
aryl which may be further substituted with halogen(s), and
halogen,
(f) aryloxy, or
(g) amino which may be substituted with aryl(s) which may be substituted with one or more

substituent(s) selected from the group consisting of aryl and heterocyclyl];

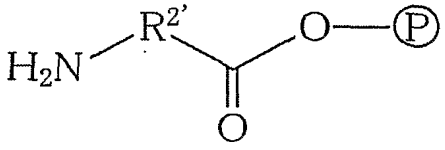
or a pharmaceutically acceptable salt thereof,

comprising, reacting a compound (IIa):



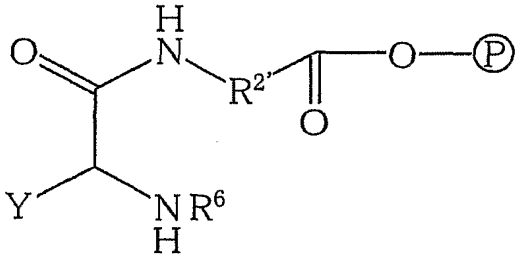
(IIa)

(wherein Y and R^6 are each as defined above), or its reactive derivative at the carboxy group or the salt thereof, with a resin-bound compound (IIIc):



(IIIc)

(wherein $R^{2'}$ is as defined above, and Ⓟ is polymer), or its reactive derivative at the amino group or the salt thereof to give a compound (IVc):

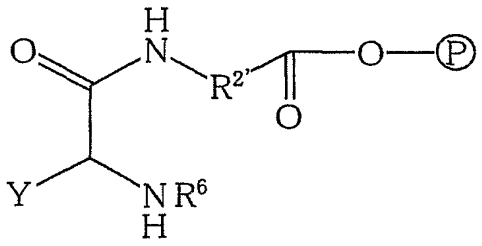


(IVc)

(wherein Y, Ⓟ $R^{2'}$ and R^6 are as defined above), or its

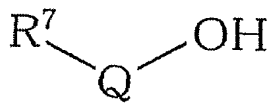
salt;

reacting the compound (IVc):



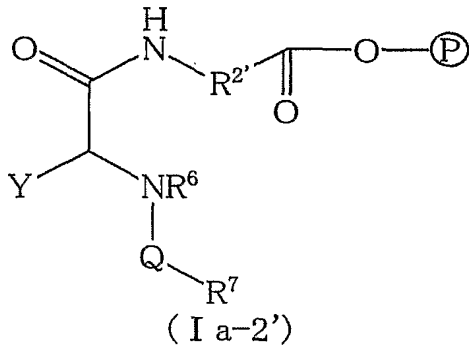
(IVc)

(wherein Y, Ⓟ $R^{2'}$ and R^6 are as defined above), or its salt, with a compound (V):



(V)

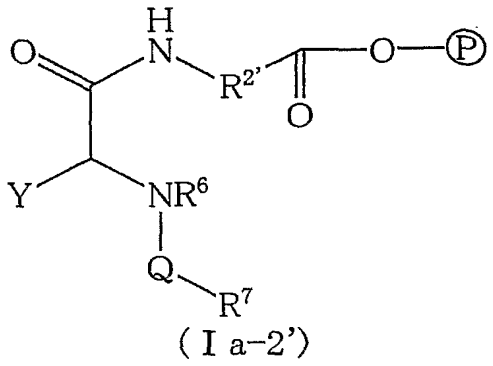
(wherein Q and R^7 are as defined above), or its reactive derivative at the carboxy group (in case of Q is -CO-)/the sulfo group (in case of Q is $-SO_2-$), or the salt thereof to give a compound (Ia-2'):



(Ia-2')

(wherein Q, Y, Ⓟ, $R^{2'}$, R^6, and R^7 are as defined above), or its salt; and

subjecting the compound (Ia-2'):



(Ia-2')

(wherein Q, Y, Ⓟ, $R^{2'}$, R^6, and R^7 are as defined above), or its salt to a cleavage reaction of the resin.

9. A compound of any one of Claims 1 to 5 for use as a medicament.

10. The compound of Claim 9 for use in the treatment and/or prevention of PGE_2 mediated diseases in human beings or animals.

11. A medicament comprising a compound of any one of Claims 1 to 5 as an active ingredient.

12. A pharmaceutical composition comprising a compound of any one of Claims 1 to 5 as an active ingredient, in association with a pharmaceutically acceptable carrier or excipient.

13. An agonist or antagonist of PGE_2 consisting of a compound of any one of Claims 1 to 5.

14. A method for treatment and/or prevention of PGE_2 mediated diseases which comprises administering an effective amount of the compound of any one of Claims 1 to 5 to human beings or animals.

15. A method for treating or preventing kidney dysfunction, inflammatory conditions, various pains, collagen diseases, autoimmune diseases, various immunity diseases, analgesic, thrombosis, allergic disease, cancer or neurodegenerative diseases which comprises administering an effective amount of a compound of any one of Claims 1 to 5 to human beings or animals.

16. Use of a compound of any one of Claims 1 to 5 as a medicament.

17. Use of a compound of any one of Claims 1 to 5 as an agonist or an antagonist of PGE_2-sensitive receptor.

18. Use of the compound of any one of Claims 1 to 5 for treatment and/or prevention of PGE_2 mediated diseases in human beings or animals.

19. A commercial package comprising the pharmaceutical composition containing the compound identified in any one of any one of Claims 1 to 5 and a written matter associated therewith, wherein the written matter states that the compound (I) can or should be used for preventing or treating PGE_2 mediated diseases.